

FEATURING—BUCKNELL UNIVERSITY

The Biologist



Vol. XXIII, No. 4

April, 1942

Medler — World-wide Importance of Stored-Food-Products Insects

Phi Sigma

BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although originally designated as an honorary biological research society, it should now be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts:

- 1915 March 17, Alpha Chapter organized, Ohio State University, Columbus.
- 1916 May, Central Governing Body organized, BIOLOGIST first issued.
- 1917 June, last War-time BIOLOGIST issued.
- 1921 February, BIOLOGIST revived.
- 1924 December, First National Meeting, Constitution revised, Washington, D. C.
- 1925 December, Second National Meeting, First Science Program, Kansas City.
- 1926 December, Third National Meeting, Second Science Program, Philadelphia.
- 1927 December, Third Science Program, Nashville.
- 1928 December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.
- 1930 January, Council Meeting, Ritual Revised, Norman, Okla.
December, Fifth National Meeting, Fifth Science Program, Cleveland.
- 1931 Phi Sigma Letters Registered, U. S. Patent Office.
- 1932 December, Sixth Science Program, Atlantic City.
- 1933 June, Sixth National Meeting, Seventh Science Program, Chicago.
- 1935 December, Seventh National Meeting, Eighth Science Program, St. Louis.
- 1937 December, Eighth National Meeting, Ninth Science Program, Indianapolis.
- 1939 December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.
- 1942 December, Tenth National Meeting, Dallas, Texas.

Expansion:

The Constitution provides that: "An active chapter may be established in any institution of learning which requires for graduation the equivalent of four years of collegiate work, and which is equipped with facilities for research work. - - - Any petitioning group must be active for at least one year before it may be granted a charter."

THE BIOLOGIST

Vol. XXIII

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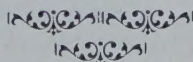
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Directory

OF ALL ACTIVE AND INACTIVE CHAPTERS

The list of chapter officers for this school year will be found in the CHAPTER NEWS section of Vol. XXIII, No. 2.

ALPHA

Ohio State University, Columbus, Ohio, founded March 17, 1915, (Inactive)

BETA

University of Michigan, Ann Arbor, Michigan, founded June 3, 1916

DELTA

University of Maine, Orono, Maine, founded January 27, 1917, (Inactive).

EPSILON

University of Denver, Denver, Colorado, founded March 5, 1917.

ZETA

University of Wisconsin, Madison, Wisconsin, founded May 30, 1917

ETA

University of Akron, Akron, Ohio, founded April 20, 1921.

THETA

Michigan State College, East Lansing, Michigan, founded April 9, 1921, (Inactive).

IOTA

Washington University, St. Louis, Missouri, founded May 28, 1921.

KAPPA

University of Kansas, Lawrence, Kansas, founded May 31, 1921.

LAMBDA

Montana State University, Missoula, Montana, founded May 4, 1921.

MU

University of California, Berkeley, California, founded April 27, 1922.

NU

Washington and Jefferson College, Washington, Pennsylvania, founded May 11, 1922

XI

University of Nebraska, Lincoln, Nebraska, founded May 3, 1934, (Inactive).

OMICRON

University of North Dakota, Grand Forks, North Dakota,
founded May 26, 1924, (Inactive).

PI

Emory University, Georgia, founded January 3, 1925.

RHO

University of Illinois, Urbana, Illinois, founded March 28, 1925.

SIGMA

University of Florida, Gainesville, Florida, founded December 4, 1925.

TAU

Duke University, Durham, North Carolina, founded March 4, 1926.

UPSILON

Miami University, Oxford, Ohio, founded May 7, 1926.

PHI

University of New Hampshire, Durham, New Hampshire, founded May 21, 1926.

CHI

Montana State College, Bozeman, Montana, founded February 11, 1927.

PSI

University of Washington, Seattle, Washington, founded April 7, 1928.

OMEGA

University of Oklahoma, Norman, Oklahoma, founded March 24, 1928.

ALPHA ALPHA

University of Southern California, Los Angeles, California, founded May 17, 1930.

ALPHA BETA

Mount Union College, Alliance, Ohio, founded May 17, 1928.

ALPHA GAMMA

University of South Dakota, Vermillion, South Dakota, founded May 15, 1928, (Inactive)

ALPHA DELTA

Lawrence College, Appleton, Wisconsin, founded March 7, 1929, (Inactive).

ALPHA EPSILON

University of Pittsburgh, Pittsburgh, Pennsylvania, founded March 23, 1929.

ALPHA ZETA

College of William and Mary, Williamsburg, Virginia, founded April 19, 1930, (Inactive).

ALPHA ETA

Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma,
founded March 13, 1930.

ALPHA THETA

State College of Washington, Pullman, Washington, founded May, 1930.

ALPHA IOTA

Bucknell University, Lewisburg, Pennsylvania, founded January 9, 1932.

ALPHA KAPPA

Hunter College, New York City, founded January 8, 1932.

ALPHA LAMBDA

University of Utah, Salt Lake City, Utah, founded February 13, 1932.

ALPHA MU

University and State College of Oregon, Eugene-Portland-Corvallis, Oregon,
founded November 18, 1933.

ALPHA NU

University of New Mexico, Albuquerque, New Mexico, founded April 21, 1935.

ALPHA XI

Rhode Island State College, Kingston, Rhode Island, founded May 17, 1935.

ALPHA OMICRON

Marquette University, Milwaukee, Wisconsin, founded June 18, 1938.

ALPHA PI

University of Colorado, Boulder, Colorado, founded May 24, 1941.



Bucknell is located at Lewisburg, along the shores of the picturesque Susquehanna River.

Bucknell University

"The Study of Biology Within 'Three Hundred Acres' "

In recognition of the commonly accepted truth, "as no stream can rise higher than its source, and no institution can be greater than the idea which created it," the Alpha Iota Chapter of the Phi Sigma Society desires to celebrate the tenth anniversary of its founding and to take this opportunity to pay tribute to the Department of Biology at Bucknell University, which made possible the founding of its Chapter and whose leadership in the field of the life sciences has inspired an active and creative membership. Therefore, the Chapter wishes to briefly review the history of biology at Bucknell—a long and interesting story which covers a period of more than ninety years and dates back almost to the founding of the University itself. Since only six years elapsed from the time Bucknell was founded on its famous "three hundred acres," until the Department of Biology was established in 1852, let us begin with the year 1846.

In imagination, we can go back to the days of the stage coach, pony express, and canal boats and can picture a small group of Baptist laymen in the town of Lewisburg, Pennsylvania, going about their daily work in that peaceful community with an ever-present desire to establish a college. In the quiet life of their day they had time for meditation and dreaming, and these founders of Bucknell converted their dreams into organized action and plan-

ning. They wanted their children and the children for miles around to have the advantages of higher education. They wanted their community to become an educational center, and they had a vision and a hope that some day it would become one of the leading small coeducational colleges of the country.

One of the objectives of the Northumberland Baptist Association in establishing a college was set forth, in part, as follows: to establish "a literary institution . . . in central Pennsylvania, embracing a high school for male pupils, another for females, a college, and theological institution." After many years of work this Association realized its first ambition when the legislature of Pennsylvania granted a charter, February 5, 1846, to the University at Lewisburg, now Bucknell University. These founders of Bucknell selected a site on a hill overlooking the picturesque Susquehanna River at the entrance to Buffalo Valley, one of the most scenic places in central Pennsylvania—a place which has since become endeared to more than 15,000 former students.

From the firm foundation of nearly a century ago, Bucknell has grown from a student body of 22 students to more than 1,300. It now has a faculty of ninety-five members. As Bucknell grew in size and in numbers, so the curriculum expanded. Today courses are offered in Liberal Arts, Biology,



A biology student adjusts the projection microscope.

Chemistry, Physics, Engineering, Commerce and Finance, and Teacher Training.

Keeping pace with the growth of Bucknell, the Biology Department has shown similar advancement. Biological teaching had its beginning when a course known as Physiology and Hygiene was introduced in 1852. During the decade which followed, several more courses in the field of biology were added to the curriculum. In 1855 a course in Vegetable Physiology was presented, and in 1859 a course known as Physiology and Zoology was introduced when the Reverend Francis W. Tustin was elected to the position of professor of Natural Sciences.

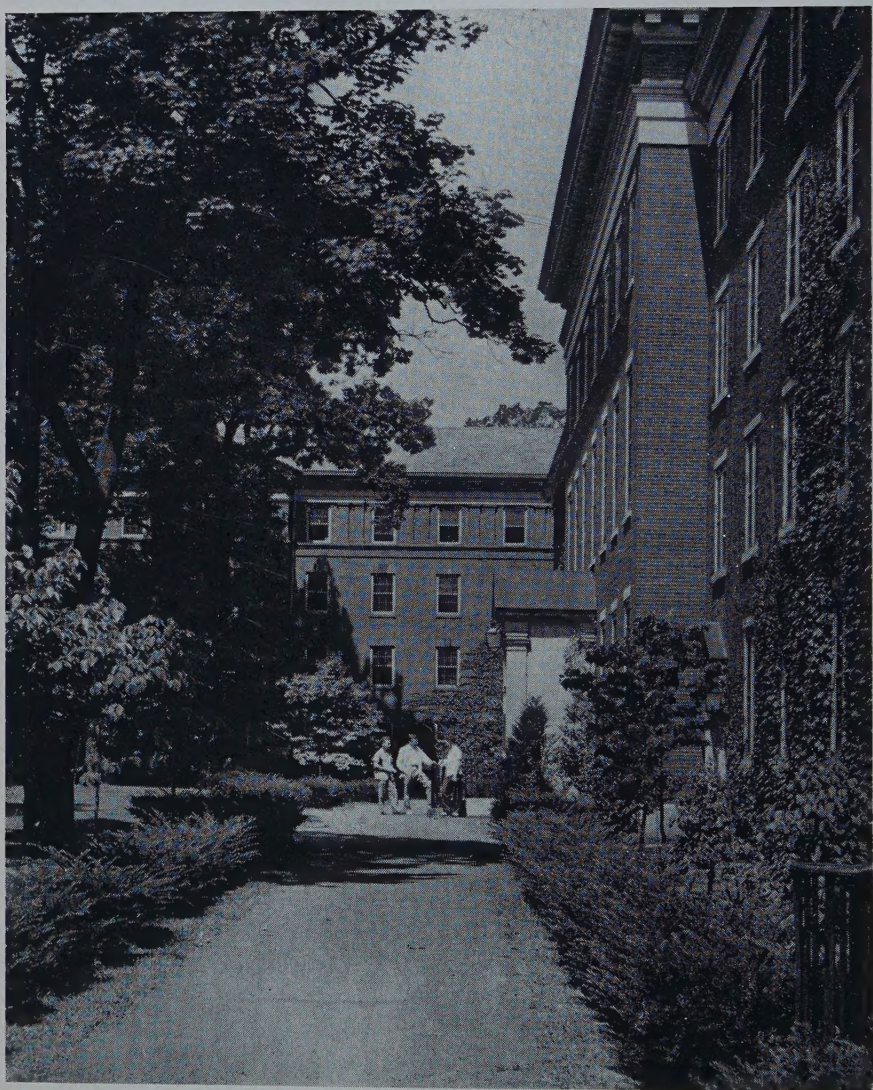
The year 1874 brought a change in the Biological Department of this University. Botany was introduced; and the modern languages, French and German, became a part of a new three-year scientific course designed, replacing the traditional languages of the Classical Course.

In 1879 George G. Groff, M.D., began a teaching career at Bucknell which was to last for a period of more than thirty years. Since Dr. Groff was a doctor of medicine, he exerted a strong medical influence on the Natural Sciences. During the years that he was at Bucknell, the University also felt the influence of a movement which was taking place in the United States, a movement which brought into existence about 457 so-called medical schools. In keeping with this movement, a medical department came into existence at Bucknell as a division of the Department of Organic Science.

In addition to Dr. Groff, three licensed doctors of medicine were added to the teaching staff of this department in 1904 to lecture in anatomy, in diagnosis, and in surgery. Others in the Department were Nelson F. Davis,

Sc.D., Assistant Professor of Organic Science, and Willis E. Maneval, Ph.M., Instructor. The purpose of the medical department at this time was not to present a full medical course but to give the student certain "preparatory studies and most of the non-clinical studies required by the medical colleges during his first two years." Therefore, when a medical student was graduated from Bucknell, he was given both a diploma and a certificate of proficiency which at that time admitted him to advanced standing in the medical school of his choice.

In 1908 the Medical Preparatory Department was eliminated, and courses such as *Materia Medica* and *Toxicology* were dropped, thus leaving an Organic Science Department which offered one of the strongest and most well-rounded pre-medical courses in the East. From this time on, great emphasis was placed on the pre-medical training of students. Young men and women were sent out from this department and were admitted without restriction to the best medical colleges of the land. Such was the case until 1930 when the Association of American Medical Colleges brought into existence certain machinery to limit the number of students who are eligible to enter the study of medicine. Such restrictions as the ability to pass the Medical Aptitude Test, together with the great expense involved in attending a pre-medical school for four years, a medical college for four years, and a hospital as interne for one or two years, has reduced the number of students who can successfully pursue a course in pre-medical training. Thus the Bucknell Department of Biology has been gradually shifting the emphasis of instruction in the organic sciences to prepare students in fundamental knowledge and skill so that many more



Men's Quadrangle. The eight hundred men at Bucknell have a complete division of dormitories, dining hall, athletic field, gymnasium, and fraternities.

outlets may be available to those who have a strong biological training. The work of the Biology Department is now carried on under the leadership of John W. Rice, Ph.D., Norman H. Stewart, Ph.D., William H. Eyster, Ph.D., and Kenneth F. Herrold, M.Sc., Ph.

Today, Bucknell stands ready to give its students the benefits of its long experience in meeting the demands of biology students. It offers a four-year course in biology with the degree of Bachelor of Science, and the attainments of its graduates have amply proved the value of this course. A member of the Department has stated one of its goals: "The staff of the Department of Biology in this college, as in any college, is committed to the responsibility of leading students in the search to an understanding of the irrevocable laws of nature that govern the lives of all living creatures and particularly man. The approach to an adequate knowledge of the human, his structure, his functions, his slow emergence from the dim past to the present, his intricate adaptations and interrelationships belong largely in the field of biology.

"In this great field of facts, of ceaseless changes, of dependencies, of struggle and survival, of throbbing life and emerging species, a teacher must set some goals for his teaching, lest he become lost in the infinite variety of details that nature presents. With these goals fixed the pathway is made certain and the satisfaction of attainment becomes more probable as a strong interest drive for the learner. As the prime goal, which we seek to attain in the teaching of biology, we designate the ability to think scientifically. By this we mean clear, logical, critical, honest thinking. The basing of conclusions on the secure

tripod of careful experiment, keen observation, and concise deduction. With these there comes a deliverance from careless, inaccurate, lazy generalization."

One of the outstanding characteristics of the Biology Course is that each student is led into intimate contact with the subject he is studying. The location of Bucknell makes this possible. It is situated in the Susquehanna River Valley and is surrounded by the Appalachian Mountains with their extensive woods and streams. Every advantage is enjoyed whereby plant and animal life can be studied. Years of collecting have enriched the museums with specimens, and careful attention has been given to assembling such materials as charts, models, microscopic slides, skeletons, and cultures which provide visual aid to the students in the laboratory.

The subjects for the four years of the Biology Course are arranged in such a way that they will best meet the needs of the student interested in laying a firm foundation in biological and related sciences. In the first year a student begins his work in science and, at the same time, takes other subjects which are desirable for their cultural value. Thus he becomes trained in his special field and also develops an appreciation of other branches of human knowledge and attainment that tend to make it possible for him to take his place in the world as a broadly-educated man. During his last two years the student is given an opportunity to specialize in those subjects that will best prepare him for his particular chosen work. Pre-medicine, pre-dentistry, teacher training in biology, laboratory technology, bacteriology, and botany—each represent fields of study to which the student may devote his time and

energy. The courses offered in each of these fields have proved to be worthwhile, for after graduation Bucknell men and women enter the leading medical and dental schools of the East. Bucknell graduates are found among the teachers of science in some of the best schools and colleges, and Bucknell's competent and well-trained bioanalysts and technicians are found working in well-known hospitals, clinics, and research laboratories.

In keeping with the founding of Bucknell University and the spirit of its leaders, the Alpha Iota Chapter of the Phi Sigma Society, national honorary biological fraternity, was established at Bucknell University in 1932. To be eligible for membership in this Society, a student must have completed at least eighteen hours of study in biology and obtained an average of 80% in his biological studies and an average of 75% in his other courses. He must have shown a special interest in biological research by completing and reporting an original piece of research in the Department. If he meets these qualifications, he is then initiated into

Phi Sigma which affords him the opportunity of working with faculty members and fellow students and of establishing friendships which last beyond graduation.

The Iota Chapter has tried to perpetuate the principles of scholarship and individual attainment in the field of biology by encouraging study and research on the part of the students and rewarding them for their efforts by initiating them into this fraternity. Each year the Society publishes the *Phi Sigmian*, an annual report of student research papers read before the Society. The *Phi Sigmian* is now in the fourth year of production, and its circulation to the area biologists continues to increase.

Thus as a small unit of the educational structure of Bucknell, the Iota Chapter of the Phi Sigma Society makes its contributions towards the advancement of student interest in biology, aids the Biology Department by furnishing an extracurricular outlet for study and research, and helps to perpetuate and maintain the highest ideals of the University.



World-wide Importance of Stored-Food-Products Insects

JOHN T. MEDLER*

Food is one of the weapons of war. In war-time enormous quantities of food may be stored for long periods of time, either in the country of origin because of a disruption of commerce, or amassed in densely populated areas as a precaution against famine. The armed forces must be abundantly supplied with food. Food supplies for expeditionary forces are concentrated in depots and transported great distances. It is conceivable that the destruction of food supplies while in storage or in transit can greatly weaken the effectiveness of the food weapon, and may be a factor in winning or losing wars.

Stored food products are continually menaced by a fifth column. This fifth column is an army of tiny insects that destroy stored food or renders it unfit for human consumption by contamination. The depredations of these pests may begin with crops that are in the field, continue while they are in storage, and persist after they are manufactured into food products. The farmer, the manufacturer, and finally the consumer suffer loss in varying degrees. The importance and serious nature of these losses are impressed on everyone in times of war, when every product is of utmost value.

The problem of insects attacking stored products is world-wide. Food

products are provided not only by a hinterland, but frequently are imported over the seas from a distant region. Consequently, many insect pests have been widely distributed by the medium of trade, and many of them are firmly established throughout the world. Fortunately many of these cosmopolitan insects are of minor importance in the temperate zones, and frequently are destructive only because of the highly artificial environment of storage places. However, there is a large number of species of insects that are of major economic importance in stored food products throughout the world.

The species of insects infesting stored products are primarily determined by the kind of food which is available. Grains are an important food source. Wheat, which is the greatest cereal food, is produced in large quantities in the United States, Europe, India, China, Argentina, Australia, and the Soviet Union. Rice grows best in a warm, wet climate; hence it is the principal food crop in southeastern Asia. Rye, which is hardier than wheat, is grown in many sections of the Soviet Union, Poland, and Germany. Since grains yield the most valuable agricultural crops, the insects attacking stored cereals and cereal products are probably the most important. They may be classified as pests of primary or secondary importance according to their ability to attack whole grain or only grain fragments. Both types of

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pests may be present at the same time in stored grain, however, since the primary type soon provides fragments in which the secondary type can establish itself. Although the damage by primary pests is of greatest economic importance, an infestation by secondary pests in manufactured products may render the food unfit for human use.

The most important primary pests in stored grain are the rice weevil, *Sitophilus oryza* (L.), and the granary weevil, *Sitophilus granaris* (L.). From an examination of world-wide literature, the relative status of the two species in the important grain producing areas may be summarized:

The granary weevil

United States—common in wheat in northern states.

Germany—bad in stored wheat and rye.

Russia—a serious pest in wheat.

Asiatic Russia—a ubiquitous pest in wheat.

Australia—damage to wheat often reported in southern parts.

The rice weevil

United States—common in grains in the southern states.

Australia—the most abundant species in wheat.

India—a common pest in grain, and immensely harmful.

Argentina—the most important species in wheat.

Asiatic Russia—a common grain pest in warmer parts.

China—common in rice godowns.

It is apparent that the two weevils vary in their importance in grain regions throughout the world. The granary weevil is limited to colder

climates; therefore it is principally a pest in wheat and rye. The rice weevil, however, is widespread in the warmer climates, where it causes great damage to all kinds of grains.

Second in importance to the weevils as pests of stored grains is the Angoumois grain moth, *Sitotroga cerealella* (Oliv.). This insect was first noticed as a serious grain pest about 200 years ago in France. Authorities believe that it was introduced into France in shipments of grain, probably from a subtropical region. Although the moth became abundant and widely destructive in France in the years soon after its discovery, its importance in that country has declined since the middle of the 19th century. This has been brought about by improved transportation facilities and by the practice of promptly importing grain to supplement small wheat crops, thereby eliminating speculative hoardings of grain in which the insect may develop.

The Angoumois grain moth is widely distributed throughout the world by commerce. However, it is unimportant in places with cold climates because this species needs a warm, humid type of climate for development. It is generally reported as one of the major pests of rice in areas where that crop is grown. In the United States the moth is a serious pest in the eastern wheat region, i.e., east of the Alleghenies, from Pennsylvania southward. The insect is a major grain pest in the warmer areas of Australia, India, and the Soviet Union.

The lesser grain borer, *Rhizopertha dominica* (Fab.), is a primary pest of whole grain. It has been carried by commerce to all parts of the world. But serious damage is caused only within areas 40' N and S of the equator in those regions with a dry, warm climate. This insect is the most serious pest of

stored cereals in India, and is a major pest in N. S. Wales and Argentina.

Insects in manufactured grain products are a modern innovation, for it is doubtful if they were troublesome when flour was ground each day to supply the needs in primitive society. The modern practice of large-scale milling, and the wide distribution and storage of grain products have created an ideal medium for insect infestations. There is a very large group of insects that infest manufactured grain products, but only a few species cause serious damage throughout the world.

Beetles in broken grain, flour, and other prepared cereal products are popularly called "bran bugs." Members of the genus *Tribolium* are the most abundant and destructive species. Two species have been recorded as pests in almost every country of the world. The confused flour beetle, *Tribolium confusum* Duv., is the most important. It is limited primarily to colder areas. The closely related rust-red flour beetle, *Tribolium castaneum* (Herbst), is more commonly found in warmer areas and is secondary only to the confused flour beetle as a pest.

The larvae of several species of moths are serious pests of manufactured cereal products. The Mediterranean flour moth, *Ephestia kuhniella* Zell., is found in flour products throughout the world. It causes trouble in mills, especially where a high temperature is maintained throughout the year, by webbing and matting flour particles together so that many times the machinery becomes clogged. The Indian meal moth, *Plodia interpunctella* Hbn., is an economically important pest in warehouses; infestations are commonly recorded from many different kinds of cereal products. A particularly objectional habit of the larvae is the spinning of silken webbing throughout

the product. Since there are few records of the moth's maintenance out-of-doors, it probably is an insect of tropical origin that has become firmly established indoors.

The problem of insect infestations in the food products of crops from perennial plants is somewhat different from the problem of insect infestations in cereals. Usually these crops, e.g., fruits, cocoa, nut meats, tobacco, drugs, and spices, are harvested in tropical or subtropical regions and dried or stored for relatively long periods of time. A great number of pests infest these products, almost all of them being scavengers or secondary invaders with omnivorous food habits. Most infestations originate when the product is being dried or is in the packing shed. The initial infestation is greatly aggravated by storage in warm places and by long sea voyages. Also, several cosmopolitan species are carried in ships and may infest the product while it is in transit. An outstanding example of the latter is the cadelle, *Tenebriodes mauritanicus* (L.). The larvae of this insect are commonly present in burrows in the wood of ships. Cargoes from South America nearly always carry the cadelle; while nut meats from the Mediterranean are often infested.

Cocoa is strictly a tropical crop, the tree not being commercially grown outside an area 12' N and S of the equator. The cocoa bean is exported in large quantities to temperate countries. Two insects are important pests. They are the cocoa weevil, *Araecerus fasciculatus* DeG., and the chocolate moth, *Ephestia elutella* Hbn. It has been shown that the cocoa weevil attacks the beans while they are in the drying trays, but causes negligible injury. However, by damaging the seed coat, it paves the way for subsequent in-

festations^e by the chocolate moth, which feeds only on broken and improperly fermented beans. The infested beans are a source for infestations by the moth in chocolate factories. Also infestations may occur in chocolate candies, thereby causing a serious blow to the prestige of the candy manufacturer in addition to the ruination of his product.

A very large number of insect species attack dried fruits, nuts, tobacco, and spices. Many of these are tropical forms that initiate infestations in warm countries but cannot maintain themselves in colder climates. A few are of major importance. Fruit on the drying racks attracts the dried-fruit beetle, *Carpophilus hemipterus* (L.). Fruit that is in the drying shed is infested by several species of the genus *Ephestia*, popularly known as raisin or fig moths. Fruit that has been stored and packed for a little while becomes very attractive to the Indian meal moth, *Plodia interpunctella* Hbn. This species is the most serious pest of dried fruit and is capable of reinfesting packages until the product is a total loss. After a considerably longer period of time insect scavengers infest the product, the sawtooth grain beetle, *Oryzaephilus surinamensis* (L.), being particularly common.

The tobacco or cigarette beetle, *Lasioderma serricorne* F., has been recorded from a very wide range of stored food products. Baled tobacco is readily attacked, preference being given to the better grades of cured leaf. The chocolate moth has apparently formed a new food habit in recent years, for in addition to chocolate products it is now widely reported as a serious pest in tobacco products. The drug-store beetle, *Stegobium paniceum* (L.) is commonly found in herbs used for drugs, hence the common name. It

is a serious pest of spices, and feeds on many other food products in most parts of the world.

The above discussion outlines but briefly a few major insect pests in stored food products. Those included are primary pests of great economic importance throughout the world. All of them annually cause irreplaceable losses by destroying food products or rendering them unfit for human consumption. It is conceivable that their depredations may cause a serious weakening of the war food effort. This is especially true should food stuffs be stored or shipped for the supplying of expeditionary forces in the tropical regions. Storage in warmer climates greatly adds to the problem; for not only are there many more insect species capable of infesting foods, but the warmer environment speeds up insect life cycles and hastens the complete destruction of the infested food.

What can be done about the insect menace to stored food products? Fortunately, the entomologist is able to suggest various methods of control. These are based on a knowledge of the species concerned, their habits, life histories, and environmental needs. Since infestations of food products may be initiated at several places, i.e., the farm, mill, warehouse, retail store, or the home, the food should be guarded from the time it is produced until it is consumed. Grain on the farm should not be placed in storage in old or previously infested bins that might harbor insect pests. An effective method of control, such as fumigation, should be employed immediately when infested grain is discovered. It is safe to say that all flour mills are infested with insects. Mills and warehouses should be regularly fumigated.

For all food products it is essential that insects be prevented from infest-

ing the product as it is being packaged. Not only do containers provide a place for uninterrupted breeding, but the presence of the insect is not revealed until the package is opened. Food products used in the home should be stored in clean, tight containers after the original package has been opened. The Indian meal moth, which is probably the commonest insect found in houses, rapidly spreads from one opened package to another.

In the event that food is shipped long distances and stored for long periods of time, the food package should be made from materials sufficiently strong and tight to withstand entry by insect pests. Infested ships should be properly cleaned-up by fumigation or

other effective preventive methods before food products are loaded for long sea voyages. At the place of embarkation and debarkation properly built warehouses that can be cleaned and fumigated should be used for food depots. One safeguard in warehouses is to move older stocks out first.

Briefly, it might be said that once the food product has left the manufacturer, the best insurance against pests is the proper selection of storage or transit space, careful inspection for the presence of insects, and prompt identification of the species so that proper control methods can be recommended. Only by eternal vigilance can the insect fifth column be kept at bay!



Research in the Department of Biology, University of Utah

Dr. Ralph V. Chamberlin, Head of the Biology Department, is interested primarily in the Diplopods, Chilopods, and Arachnida. At the present time he is working on the identification of a collection of centipeds and millipeds for the National Museum of Mexico, who expect to publish his report of the collection after the work is finished.

Dr. Walter P. Cottam, Professor of Botany, has completed an article, soon to be published, on a comparison of grazed and ungrazed canyons of the Wasatch Mountains. His present research treats the successional changes in desert vegetation and the recent climatic changes in the Great Basin, as indicated by tree ring growth. He will give a report of the latter before the Utah Academy of Science in May.

Dr. Don M. Rees, Associate Professor of Zoology, in addition to his already published bulletin on Mosquito Abatement in Salt Lake City, has completed a taxonomic key on the Mosquitoes of Utah which is ready for publication. It deals with taxonomy, distribution, life histories, habits, and economic importance of Utah mosquitoes. Dr. Rees will lecture on Utah mosquito control at the annual meeting of the New Jersey Mosquito Extermination Association in Atlantic City to be held in March.

Dr. David T. Jones, Associate Professor of Zoology, who has just returned from his sabattical leave, is continuing his research on comparative histology. He recently published a Field Manual of Maps of Lake Bonne-

ville, which is a supplement to Dr. Pack's treatise on Lake Bonneville.

Dr. Angus M. Woodbury, Associate Professor of Zoology, in cooperation with others, is emphasizing work in vertebrate ecology with special emphasis on birds and reptiles. In ornithology he is preparing a paper on the birds of the Navaho country of Southeastern Utah and Northeastern Arizona, and one on the birds of Utah. He is also investigating the behavior of reptiles and birds, with special emphasis on the migration of the latter.

Dr. William H. Behle, Assistant Professor of Biology, whose interest lies principally in ornithology, is making a systematic survey of the Ava fauna of Western Utah. He has recently completed work in the southwest corner of Utah in Washington County, where he collected 1000 birds and discovered a new race. Also of considerable importance is his Revision of the Horned Lark of the Western United States, shortly to be published.

Dr. Seville Flowers, Assistant Professor of Botany, has ready for publication a key of the taxonomy and distribution of Utah Ferns. He has already published a study of Utah Algae and Mosses.

Dr. F. E. Stephens, Assistant Professor of Biology, worked during the summer gathering data on the inheritance of fur types in the silver fox of this region. At the present time he is conducting an experiment to determine the correlation of time of maturing and color in snapdragons. He

has also been working with Mr. Roy Gilbert on the inheritance of the tumbling habit in pigeons, the data on this study now being complete after five years of research.

Dr. S. D. Durrant, Instructor of Zoology, is currently working on the effect of Pleistocene Lake Bonneville on the distribution and variation in the rodent genus *Thomomys*. Several papers describing new forms have already been published.

Mr. C. A. Richins, Instructor in Biology, read his recently published paper on The Development of the Midgut in *Aedes dorsalis* Larvae at the convention of the National Academy of Science held at Dallas, Texas, two months ago. He is currently working on the effect of temperature on insect metamorphosis, the work being primarily histological.

Mr. Wilton Ivie, Instructor in Zoology, has just finished a survey of the Agelenidae. He is now working on the identification and classification of miscellaneous spiders. He has just returned from a trip to the East where he visited some of the principle museums.

Mr. Stanley Mulaik, Instructor in Biology, in collaboration with Mrs. Dorothea Mulaik, is doing taxonomic work on Isopods, Phalangidae, Myriopods, and Reptiles. He is at present studying a possible new genus or order of Arachnida.

Considerable research is being done by student members of Phi Sigma at the University of Utah.

George Wallace Bradley is writing his thesis on Seedling Anatomy and Origin of secondary Structures in *Eurotia lanata*. This plant, commonly known as winter-fat or white sage is of great economic importance in grazing and is being threatened with replacement by inferior plants.

Charles S. Richards has nearly completed his work on the crustacea, emphasizing the systematic and ecological aspects of the Astracods of the area around Salt Lake City.

Miss Patricia Dougall is completing her thesis on The Shade Trees of Salt Lake City. This study includes a history, survey of planting trends, and a key to and descriptions of the species.

Jack Woolstenhulme, before joining the Marine Corps, completed a research paper on the Snails of the Uintah Mountains of Utah. His paper on the new accessions to the Invertebrate Museum of the University of Utah is soon to be published in the University of Utah Biological Series.

Lewis Nielsen, our chapter president, is writing a thesis on the Biology of the Common Pest Mosquito of the Intermountain Region, *Aedes dorsalis*. This study includes ecology, taxonomy, life history, and food habits.

Roland Gaumer's field of research is medical entomology. He is at present working on mosquitoes and ticks.

Wesley P. Larsen is bringing to completion his work on The Taxonomy and Ecology of *Thysinura* in Salt Lake City.

Chapter News Letters

Epsilon

—University of Denver

Into the ranks of Epsilon Chapter have come nine grand new members: Pauline Berkens, Ernest Forman, Carol Hilderman, and Henry Earl Morris, Jr., all of Denver, Kenneth Dumars, Jr., of Englewood, Colorado, Mary Gunkle of Colorado Springs, Lynn Keys of Portuguese East Africa, Sadao Masuko of Hiroasaki, Japan, and Gwen Mallary of Alliance, Nebraska. This encouragingly large group was initiated January 23rd, followed by dinner at the Buchtel Club, with Mr. Joseph Bixby, City Forrester of the City and County of Denver, speaking on "New Developments in Forestry and Horticulture." Placecards were clever originals by Mrs. Frances Becker, faculty member, made from fish scales, twigs, butterfly wings and what not.

The neophytes were required to prepare the usual pledge research papers, read at subsequent meetings. At the February 18th meeting Mary Gunkle presented "Mechanical Tissues in Plants" and Lynn Keys, "The Camera Lucida and Its Use." Kenneth Dumars, Jr. presented his paper on "Effects of Morphine Upon the Differential Cell Count of the Rat."

Thus far the Chapter has suffered the loss of its vice-president, Don Guthrie, and Donn Smith, graduate member, through conscription. They are sorely missed and the group sends them heartiest greetings.

ELIZABETH LOVE.

Zeta

—University of Wisconsin

At a time when we graduates in colleges and universities are momentarily expecting the summons that will join us to military defense; when many in our ranks already have been directed to defense posts, as mutely testified by the increasing office space in the various academic buildings; when those remaining add to the ex-

acting demands of their own jobs those of the ones who have been asked to interrupt their scientific training; these, then, are better times than ever, to reflect with calmness upon the "jobs" of those of us performing our respective tasks "behind the lines." Better in which to reflect more sanely than ever before the responsibility of our positions, important not only now but for the future of our work; better to reinforce our strength of mind and vision in order to put first things first, and to play our small but collectively important parts with sobriety and judgment.

In spite of added responsibility and serious mein, Phi Sigma, here at least, has not been swamped by war hysteria. Men are still hard at work in the interests of science! Work which, as the following notes will attest, has been sprinkled with some fun . . . and an appreciation of living!

On Friday, December 12, some fifty members and guests of Phi Sigma gathered around the banquet table in the University Club. The precedent set last year, that of serving wine before the banquet, was enthusiastically continued this year, and it may be added, increased considerably the holiday mood of the group. The fraternity was honored with the presence of Dr. Norris F. Hall, Chairman of the Chemistry Department in this University. In the lazy, after-dinner atmosphere, the program of the evening was set in rhythm with group singing of some of the old favorites, both biological and old time, lead by Eugene Elliott and Mel Carriker. The fraternity quartet, George Griess, Lem Fraser, Mel Carriker, and Bert Meyer, then rendered "The Drinking Song" with due respect to proper pantomime. Dr. Hall, next on the program, surprised and delighted the group with a vocal rendition of his own. He spoke on "Reflections on Science." His comments concerned mainly the state of American industry and technology at the present day. He emphasized those industries

having some bearing on natural resources and the conduct of war. Probably a more timely subject could not have been chosen as the United States has just been at war for two days. Dr. Leon Cole, Professor of Genetics, kept the evening rolling in great style in his capacity as toastmaster.

President Charles Winkler initiated the new members. These were as follows: Joseph E. Green, Soils Department, hails from Schofield, Wis.; James H. M. Henderson, Botany Department, from Falls Church, Virginia; Louis W. Holm, Zoology Department, Madison, Wisconsin; James E. Kuntz, Botany Department, Leipsic, Ohio; Bert J. Meyer, Zoology Department, Milwaukee, Wisconsin; Gene H. Spitzer, Biochemistry Department, Wauwatosa, Wisconsin; and Wallace H. Wolff, Zoology Department, Madison, Wisconsin. Gene Spitzer in behalf of the new members returned the president's welcoming address.

The efforts of the banquet committee were well rewarded in the success of the banquet. Jack Hayes was chairman of the committee. Joseph Tamulis and Howard Hillemann were his right-hand men.

And now for a glance at some of the more interesting meetings of the past few months. On November 13, Dr. Perry W. Wilson, Associate Professor of Agricultural Bacteriology, presented a discussion on "Biological Nitrogen Fixation." Dr. Perry studied in Finland as a scholar and added much to his discussion by the injection of remarks on Finland. He enumerated three typical problems encountered in this study: The fixation of nitrogen in red clover by an enzyme system; growth factors for bacterial growth; and the excretion of nitrogen by leguminous plants. He brought out that a non-legume growing in proximity of nitrogen-fixing plants can utilize this nitrogen. Excretion, he stated, is dependent in part on climate, on longer days and cool temperatures in the early spring and autumn.

Before commenting on the next meeting of the fraternity, it is with painful recollection that I mention the death of one of our most promising graduate assistants, Charles Lines. He came to us from DuBois, Pennsylvania, and held a fellowship in the Department of

Botany. I shall say no more, as his good friend and room mate, Lemuel Fraser, teaching assistant in the Department of Zoology, has written a special article which will appear in THE BIOLOGIST.

At our meeting of November 27 Charles Lines was elected to represent Zeta Chapter at the National Convention of Phi Sigma Society in Dallas, Texas, January, 1942. Charles Winkler was elected alternate representative.

At this same time, Ted Walker of the Zoology Department, presented an excellent series of kodachrome slides taken in many of the various places he has had opportunities of visiting: Oklahoma and Montana, the southwest desert of Nevada and Utah, the New York World's Fair, Glacier National Park (where Ted has been spending his last few summers as ranger), and Woods Hole.

For the past few years our gatherings have always been held in the Biology Building. On January 8th, a temporary change in location of the meeting place of the fraternity was inaugurated. Now occasional meetings will be held in other departments in order that more intimate relations between members of the different departments may be fostered. This is a change which should have been innovated long ere this! At this meeting, members in the Genetics Department acted as hosts, and several presented short talks on their research. Those speaking were E. J. Britten, E. A. Kerr, E. J. Warwick, R. L. Murphree, and R. M. Shackelford. Unfortunately I have been unable to get complete notes on their genetic researches.

The new semester in 1942 saw a continuation of the policy of holding meetings at other departments. This time Agricultural Hall played the part of host. Mr. Ralph O. Marts, of the U. S. Forest Service, presented an illustrated lecture on "Wood Structure and Wood Quality"; Mr. Marts received his training in Botany in Kansas and Iowa, and is now plant anatomist at the Forest Products Laboratory, specializing in wood structure and growth conditions and taxonomy. He showed lantern slides of various forest types all over the country and indicated the various abnormalities in tree growth which affect the structure and value of the wood.

And finally at our most recent meeting, February 26, the fraternity met at the Biochemistry Department. Members of this department discussed some of the research being done there. Irving Coombes discussed work that he and Gene Spitzer have been doing in the last two years, on the effect that fresh fish has in knocking out vitamin B₁ (thiamine), and the polyneuritis that results. Such symptoms in the fox, for example, are known as Chastek. The work has been duplicated in chicks.

James Shaw of the same department spoke on the pathological symptoms resulting from riboflavin deficiencies in embryonic chicks, and in hatched chicks, and in young rats and dogs.

At this same meeting Dr. Leon Cole gave a report on the national convention held in Dallas during the Christmas holidays.

And so with the approach of the dead line for this issue of THE BIOLOGIST, also terminates my stay in these pages as editor. It has been fun . . . and very instructive!

MELBOURNE R. CARRIKER,
Editor.

Kappa

—University of Kansas

Dr. O. S. Pettingill, Jr., of Carleton College came to the University Campus, under the auspices of Kappa Chapter on February 13th, to give two lectures, "Birds of Mexico" and "Birds that Haunt the Waterways." His pictures and lectures were informative and interesting.

At the last meeting, new officers for the year 1942-43 were elected. These are:

President—George Rinker
Vice-President—Kenneth Moore
Treasurer—Florence E. Dill
Secretary—Seymour S. Kalter

The following initiates will be formally initiated at our next meeting April 15th: Mary Elizabeth Evans, Dorothea S. Franzen, Burton Bennett Hodgden, Henry Berry Ivy, Verlyn Norris, Jean Olive Rubbra, and Sheldon Keith Spalding.

Reece I. Sailer gave a paper entitled, "Nest Temperatures Among the Hymenoptera" at our March meeting.

SEYMOUR S. KALTER,
Secretary.

Lambda

—Montana State University

Initiation was held March 5th. The following were initiated: Bruce Allison, Phyllis Berg, Herbert Erickson, Annetta Grunert, Myrtle Harry, Dana LeVally, Dorothy Mitchell, Bill Reed, John Robertson, George Santistiban, Anne Simms, Richard Smith, Helen Van Blaricom, Patty Anne Wood, Charlotte Toelle, Christine Warren, Bob Dow, Gordon Holte, Dr. J. S. Pennepacker, Dr. Daniel Posin, Dr. T. O. Berge.

Dr. Pennepacker, Dean of the Billings Polytechnic School, was the chief speaker at the initiation banquet. He spoke on "The Biological Concept of Life from the Viewpoint of Philosophy." A grand climax to the program of pre-initiation which included carrying flyswatters, wearing mousetraps, wearing lab coats, and at all times carrying a living object, which you had to prove was living, and be able to give its entire classification.

Dr. Herald Cox, chief bacteriologist at the Hamilton laboratory and an Honorary member of Phi Sigma, discussed typhus fever and its effect on world history, and President Melby presented diplomas to 29 men who completed their Civilian Pilot Training work during either the summer or autumn quarter of this past year, at convocation meeting.

Hazel Hayden, our President, has done an excellent job. She has successfully launched a meeting system which includes both technical and social variations. So far this quarter we have had several professional men as our chief speakers at our meetings. They discuss problems of interest to our varied group. Our social meetings have included general gab fests and a sleigh ride.

Four of our members—Rollin Baggenstross and Warren Bradeen, Jack Schmautz and Bill Hodge—were recently pledged to Druids, Forestry honorary. Mr. Hodge was elected president.

Mu

—University of California

Mu Chapter closed the fall semester with an initiation banquet and a dance on December 5th. Thirteen new mem-

bers were initiated. No one complained of being superstitious. Lieut. Rosenberg of the Naval Bacteriological Unit presented a film in color showing the measures which are being taken to study and combat the problem of influenza among navy personnel. Vaccines are being developed and produced in quantity. It is doubtful if influenza will ever become the scourge that it was in World War I.

For the first meeting of the spring semester, Dr. Paul L. Kirk delivered a fascinating talk on microbiological methods as applied to criminological investigation. Dr. Kirk works in close collaboration with the local police departments (as well as being an associate professor of biochemistry) and illustrated his talk with descriptions of many actual cases. The meeting was so interesting that it extended more than an hour beyond the usual time.

As an indirect result of the war, there has been a sharp decrease in attendance at meetings of all the campus organizations, ours among them. Several of our members have left to enter the services of the armed forces; others are attending warden's school or red cross classes, and everyone is spending an increased amount of time in study and research.

JAMES W. HANSEN.

Nu

—Washington and Jefferson

This year Nu Chapter has enjoyed a highly successful program, and there are several outstanding events still in the offing.

On February 25th, an extremely entertaining and informative motion picture, "Pavlov's Experiments on the Conditioned Reflex," was presented. An interesting discussion led by Drs. Dieter and Weyer followed.

Twelve pledges have now completed the requirements for membership set up by our chapter. With the help of our faculty advisor, Mr. Osterman, plans are now being laid for the annual initiation and banquet early in April.

Our president, Ray Elliott, has joined the Army Air Corps; his place is being ably filled by Alvin Bales.

JAMES D. EBERT,
Secretary.

Sigma

—University of Florida

It is quite appropriate that a group of students in biology and of subjects akin to that science should sponsor any organization that tends to preserve wildlife. So Sigma Chapter became affiliated last fall with The Florida Wildlife Federation. Dr. T. H. Hubbell, as our delegate, Drs. F. S. Rogers and Archie F. Carr, and Mr. J. C. Dickinson, all members of Sigma Chapter, and Mrs. Carr, attended the meetings of that organization in Jacksonville, Fla. Sigma Chapter was very proud to have Dr. Archie F. Carr elected Vice-President of the Federation.

Another successful evening for Sigma Chapter was the Initiation banquet, which was held on December 1st. Six new members were initiated. The speaker for the occasion was Dean Harold H. Hume of the College of Agriculture. The title "Old Books" had been given for his address; we seemed to be somewhat far from biological sciences with just those two words. But books do not mean literature only, and we were quickly back into the field of Natural Sciences when Dean Hume displayed for our enjoyment and commented the most interesting and exquisitely illustrated "old books" of Botany dating as far back as the 18th century. Dean Hume is not only a specialist of plant life (and of lilies more specifically), but he certainly is a real bibliophile. Some of the rare books he owns have been collected patiently through the years and from many different places in the world. Books on citrus had quite a share in the display, as is fitting in Florida, the land of citrus industry.

Since that evening, Sigma Chapter has not been quite so fortunate, and two of the lectures had to be given up, one because of illness of the speaker, the other because Dr. Black was meeting some urgent obligations in the field of Civilian Defense. The time of his lecture was then given to Mr. Juliano, our delegate to Dallas, who gave us a thorough, vivid account of the work of the National Meeting and of the address he was fortunate to listen to during the banquet.

Three more meetings are scheduled before the regular school year comes

to its close; already the crowd is thinner, for some of our younger members have been drafted; others have enrolled on the "home front" in activities the schedule of which conflict with our own. Despite these difficulties we shall keep the Chapter as alive as possible through the coming months, and let's hope for the best, for all of us!

YVONNE T. BRANNON,
Secretary.

Upsilon

—Miami University

Upsilon Chapter has no extraordinary news to report for the last month. At the two most recent meetings we have had as speakers: first, Dr. R. A. Hefner, head of our Department of Zoology, who emphasized the importance of heredity in our make-up, and second, Dr. W. C. Biel, of our Department of Psychology, who brought forth the environmental factors as agents causative in our behavior and mental constitution. As one might expect, these talks elicited an interesting discussion.

Upsilon Chapter, upon consultation with its delegates from the National Convention, decided to initiate second-semester Sophomores who may have completed the other requirements for membership in the society or who give promise of successfully completing such requirements at the end of the semester in progress. This, we hope, will prevent too radical a diminution in our enrollment for the coming year, and allow the initiates a longer time to enjoy the privileges of membership.

Present members of the Upsilon Chapter of Phi Sigma who are now in the service, having left during the school year, are: Kenneth Penrod, Russell Perkins, and Ralph Stacy.

If anything of unusual interest should occur here between now and March 10, I shall inform you of the matter.

HARLEY P. BROWN,
Corresponding Secretary.

Chi

—Montana State College

Chi has something to offer in the way of local color. It is a four hundred-foot reel in color filmed by five of the chapter members on their rather recent

two-day outing in Yellowstone Park. In it are shown all the species of animals native to the Wonderland including elk, deer, mountain sheep, coyotes, bison, and birds. In addition there are many scenes of the park. The few feet of the film that remained on their return were taken of the Montana State College campus and the beautiful mountains which surround it.

If any chapter desires the film, it will be sent to them at a small cost in order to cover depreciation and handling.

ANITA H. MCGUIRE,
Secretary.

Alpha Epsilon

—University of Pittsburgh

The U. S. Army is getting its share of biologists from Pittsburgh. Among those who have left are: Dr. John Clark, Assistant Curator of Vertebrate Paleontology at the Carnegie Museum, who, we hear, is in the Engineering Corps. Then Dr. George Wallace, Associate Curator of Entomology, left February 11th for the infantry, where he was preceded by his brother, William, a preparator in the Department of Mammalogy at the Museum. The axe next fell on Earl B. Scott, Ph.D., who left in March to take up his duties in the infantry. Scott had been teaching defense courses at Fifth Avenue High School, Pittsburgh. Then Frank Curto, of the Phipps Conservatory Staff, joined the colors. George Wheeler, who taught Biology at Monesson, betook himself into the Army in the role of physical instructor. The Corresponding Secretary, Albert G. Smith, is now trying to get the coveted Army Wings, the while he is on duty as a Navigator to the Army Air Force. To all these who have gone, we wish the best of luck; we know you'll do your part, and we want you to come back to us when you finish the job. (P. S. The boys were all laden with requests to send back specimens. They all promised—Japs.)

The Society took a trip to arctic regions in the guise of a speech by the Rev. Maximilian Duman, Associate Professor of Biology at St. Vincent College. Father Duman is one of the youngest Arctic Explorers, and he entertained the society to many points

about Arctic Regions which he capably illustrated.

With the arrival of spring weather and scientific meetings many of the Alpha Epsilonites are leaving for points to attend such things as the American Anatomists Meetings and the American Society of Ichthyologists and Herpetologists. Delegations were led by Dr. Peter Gray and Mr. M. Graham Netting.

It was not the editors fault, nor that of the corresponding secretary, but somewhere along the way the names were switched, and lo—two Phi Sigma males discovered that their mates were switched. Apologies to all concerned.

The year is closing a success. The Chapter had a wonderful program and more important—no debits at the end.

ALBERT G. SMITH,
Corresponding Secretary.

Alpha Lambda

—University of Utah

On Saturday, January 31, 1942 Alpha Lambda Chapter initiated the following: Calvin McMillan, Thelma Terry, George Edmunds, Harold Higgins, Harold Crane, Paul Bramwell, Rudolf Glauser, Ruth Jo Barton, Margaret Smith, Jack Berryman, Clifton Greenhalgh and Kenneth Fletcher. A banquet honoring the new members followed the ceremony. Dr. Walter P. Cottam, Professor of Botany, acted as toastmaster. Dr. Ralph V. Chamberlin, Wesley P. Larsen and Calvin McMillan responded.

At a public meeting, sponsored by the Society February 5th, 1942, Dr. Rolf Bolin of the Hopkins Marine Station, Pacific Grove, California lectured on the ocean life along the California coast. His remarks were illustrated by a colored movie.

February 19, 1942, Wesley Larsen and Charles Richards, two active members, presented papers on their research problems to the Society.

March 5, 1942 Elmer Smith, of the Anthropology Department, of the University of Utah, delivered a lecture on the physical aspect of the Utah Indians.

In addition to the regular meetings held twice a month, Alpha Lambda is planning a collecting field trip to be held in the spring. Methods of mount-

ing and preserving material will be stressed.

PATRICIA DOUGALL,
Secretary.

Alpha Phi

—University of Colorado

The National Convention of Phi Sigma and the A.A.A.S. meetings held in Dallas were the principal topics of conversation at the January 13th meeting of Alpha Phi Chapter. Reviews of the A.A.A.S. meetings were presented. Frances Birk reported on plant physiology, Dr. E. D. Crabb on the relation of pre-formed areas in organogenesis, Luella Hamilton on human genetics, and Margaret Kelsall on studies of luminescence in bacteria.

R. Forrest Davis, the delegate to the National Convention, gave a summary of the business meetings and discussed a few of the papers which he heard.

At the following meeting Mr. Davis gave a very interesting talk on the "Carrel-Lindberg Perfusion Pump and its Use." A trip to Mr. Davis' laboratory made his experiments seem even more understandable as he demonstrated both the pump and the operating chamber.

"Small Mammal Taxidermy" was discussed and illustrated very nicely by Donald Magoon at the meeting on February 10th. Mr. Magoon actually went through the process which he uses in preparing mammals for display in the museum on the C. U. campus. This procedure was quite a revelation for many of us who formerly believed "stuffing animals with sawdust" was the process used.

Something new in the way of programs was heard on Feb. 23rd when the principal speaker of the evening was The President of the United States. Since our meeting had been planned prior to the announcement of his talk, a portable radio brought his message to us.

Two other speakers completed the entertainment for the evening. Frances Birk discussed experiments she has conducted in plant physiology and Verna Mace explained the embryological development of air sacs in birds.

CATHERINE BROWN,
Secretary.

Alpha Iota

—Bucknell University

In spite of the accelerated school program and the additional defense work, the biology students of Bucknell University are finding time to endeavor in biological research. The Alpha Iota Chapter of Phi Sigma has eighteen pledges this year. Plans are being made for an outdoor initiation ceremony in April.

Dr. Bush from the Geisinger Memorial Hospital at Danville, Pennsylv-

ania spoke to our Chapter and its guests on February 10, 1942. His topic was "Surgical Progress."

Dr. Allen from Cornell will be the speaker at the April Open Meeting. His subject will be "Birds of America."

Josephine Bagg, our representative to the National Convention in December, gave an interesting account of her trip and the convention at the February meeting.

GERMAINE M. ROSHON,
Secretary.



New Books

Except for the signed Reviews, the thumbnail sketches of current biological literature appearing in this section are not meant to be exhaustive or deeply critical. They aim to survey the rapidly growing field of biology. Naturally these reviews represent the candid opinions of various readers not necessarily those of the National Council, nor even those of the Editor.

INTRODUCTION TO GENERAL ZOOLOGY by NATHAN FASTEN. *Ginn and Company, Boston. 742 + viii pages. \$3.75.*

One can not say that any particular approach to the study of Zoology is the best one, because we now have text books which fit several different types of courses and which have proved entirely adequate for their purpose. It appears to the reviewer that Fasten's *Introduction to General Zoology* adds another satisfactory text to the list.

The discussions of the different groups of animals seem satisfactory from the standpoint of a beginning student. The material is logically arranged, drawings are abundant and well made, and many points can be found for commendation. The historical aspect and the attention given to economic phases of the subject seem especially worthy of remark. There is an extensive glossary, a bibliography that is suitable for the use of beginning students, and the index is so full that it occupies thirty-eight pages.

The book appears to be practical and to be attractive for use with those courses which are in the nature of a survey of the animal kingdom.

A. RICHARDS.

PLANT FAMILIES? HOW TO KNOW THEM by H. E. JACQUES, *Published by the author at Mt. Pleasant, Iowa, 1941. Price \$1.50.*

This little volume in planograph type and bound with wire rings, is a handy reference work primarily useful in field studies. To the average student of general biology of the college level it will probably be very helpful.

Beginning with the algae and going up through the entire plant kingdom to the Composites, each family in each phylum is represented in a general

key and illustrated by a pen and ink drawing. These drawings vary in quality. Some are excellent, especially in the cryptogamic groups, and some are inexcusably bad. Many of the Angiosperms are represented by only the inflorescence but it is a well known fact that for many of the families in this group it is almost impossible to select a typical representative which is characteristic and which resembles all the others. Therefore, one asks, why try to accomplish the impossible?

The book is actually an illustrated key to all the plant families occurring in the north-central portions of the United States. Some students upon whom the reviewer has tried it find it exceedingly useful. Others shun it and will have nothing to do with it. Therefore its value will lie primarily with the individual reactions of the students who use it.

The chief defect is in its extreme regional scope. One could wish that Dr. Jacques had included a wider field of distribution. Although many of the families occurring in North America are given, the list of genera included after each family is surprisingly restricted, primarily to Iowa and adjacent areas.

But it is an unusual and novel booklet and has much to commend it. To those who can use it, it will be a necessity.

MILTON HOPKINS.

DESERT WILD FLOWERS by EDMUND C. JAEGER. *Stanford University Press, Stanford University, California, Revised edition 1941. Price \$3.50.*

In his preface, the author refers to this book as a "pocket picture book herbarium." He is scientifically accurate in this statement for every

plant described in the text has either an excellent photograph or a pen and ink drawing to accompany it. The drawings are as good as any sketches can be, but it is always difficult to distinguish between species by this method of illustration, no matter how painstaking their drafting has been.

The descriptions are for the most part meagre, but the significant characteristics are emphasized. There are no keys to genera and species but merely one key to all the families, so that once a plant is placed in its proper family one must go through the entire list of plants belonging to that family and, with the aid of the sketches, pick out the one which most appropriately fits the specimen in question.

Obviously then, the book is in no sense a manual or a flora. It is hardly more than a checklist but into its preparation has gone a great deal of time and thought. Its primary interest will be to the amateur or layman and he will find it the best of its kind. Common names are listed first and these are followed by the scientific name. The nomenclature is accurate and in only a few instances does it deviate from the recommendations of the International Rules. But the author explains why these deviations occasionally occur and he is cognizant of their presence.

For a popular work covering the flora of the deserts of California and adjacent Nevada and Arizona this handy book is first-rate. If more of its kind were published, and less time spent on the ponderous and meaty local floras (which invariably need revision every few years), we would have a more complete understanding of regional floras and the technical problems involved in these floras could then be left to specialists. Mr. Jaeger has admirably fulfilled his objective.

MILTON HOPKINS.

COLLEGE ENTOMOLOGY by E. O. ESSIG. *The Macmillan Company, 1942. Price \$5.00.*

This textbook of College Entomology is a new and interesting interpretation of entomology. The style of the book is such that one can sit down and read it with much enjoyment. It is easily understood and has superb drawings, which make it an excellent book to teach from. The keys are well laid out and the bibliography at the end of each chapter is good. The parts of the insects are so well drawn that even a layman using the book to identify certain types of insects should not have much trouble. A book which should receive consideration from all teachers of entomology.

E. HIGBEE.

LABORATORY EXERCISES IN GENERAL BIOLOGY by JAMES W. MAVOR. *The Macmillan Company, 1942. Price \$2.50.*

A laboratory manual so arranged that the material presented in each exercise follows in a logical manner throughout the entire book. The idea of collecting the materials for class room work is good, although it is not always easy for large classes in city universities to have access to the fresh-water ponds. The directions are plain and easily understood. The exercises on the classification of plants and animals are given early so that students will avoid future troubles and always have them available for reference while working in the laboratory. The appendix for the instructors is worthy of note. The sketches, pictures, and diagrams for reference and for actual filling in by the students can be of great use as they are of uniform size. They can be collected by the instructor or filed away by the student. A laboratory manual which can be used with any number of texts dealing with general biology.

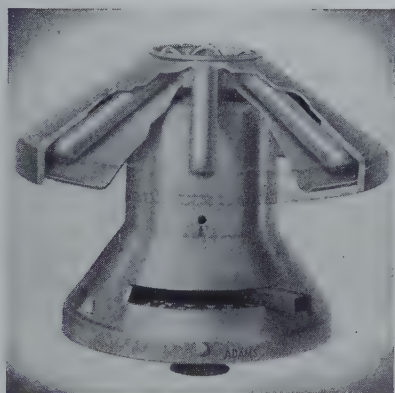
E. HIGBEE.



ADDITIONAL NAMES OF MEMBERS OF PHI SIGMA IN THE SERVICE

Austin Hammond, Alpha Beta
 Lewis Berner, Sigma
 Herbert Goldman, Sigma
 William McLane, Sigma
 Orville Struthers, Sigma
 Glenn E. Jones, Omega
 Albert G. Smith, Alpha Alpha
 Don Guthrie, Epsilon

Donn Smith, Epsilon
 Ronald McGregor, Kappa
 Glenn Turner, Kappa
 Theodore Downs, Kappa
 Morton Green, Kappa
 Norman Gerhold, Kappa
 Hal Smolin, Kappa



Also for MICRO and SEMI-MICRO WORK

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1. At the beginning of each school year furnish the names *and* addresses of chapter officers.
2. Order all chapter supplies well in advance of time needed.
3. Order certificates at least two weeks before initiation date.
4. Send initiation fees and membership record blanks at time certificates are ordered.
5. Be sure that copies of THE BIOLOGIST are received by *all* members including faculty and honorary members.

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1. Furnish a correct list of chapter officers and addresses.
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1. Furnish a correct list of chapter officers and addresses.
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